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# **OCCUPATIONAL SAFETY AND HEALTH INTERVENTIONS - INCENTIVES AND ECONOMIC CONSEQUENCES**

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# OCCUPATIONAL SAFETY AND HEALTH INTERVENTIONS – INCENTIVES AND ECONOMIC CONSEQUENCES THESIS FOR LICENCIATE DEGREE

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# ABSTRACT

## **Aim:**

The overall aim of this thesis was to extend the knowledge of factors that from an employer perspective could increase the use of research based occupational safety and health (OSH) interventions and work-place health promotion (WHP). The aim of Study I was to explore and describe what incentives influence when employers make their decisions about engaging in OSH interventions and WHP. The aim of Study II was to examine if work related stress is associated with production loss.

## **Methods:**

In Study I, focus group interviews were carried out with 20 representatives from 19 workplaces across Sweden. The study population was managers with responsibility for making decisions about OSH interventions and WHP, or employees directly involved in this work with equivalent knowledge and mandate from their managers to answer questions about these decisions. The interviews were transcribed and the data were analyzed using latent content analysis. In Study II, a cross-sectional study design was used. Data was collected through a work environment and health survey sent out to all employees at a medium sized municipality in Sweden (n=2,766). Job strain and exhaustion were used as indicators of work-related stress. Production loss at work was measured on a 10-point scale to capture the influence of work environment problems and health problems on performance during the last seven days. The scale was converted from 0-10 to 0-100 to capture the percentage loss of work time. Associations were investigated using a general linear model (GLM) regression analysis, and confounders were checked for by a mixture of backward and forward selection.

## **Results:**

In Study I, the following incentives were identified in the analysis: “law and provisions,” “consequences for the employer,” “knowledge of worker health and workplace health interventions,” “characteristics of the intervention,” and “communication and collaboration with the provider.” The incentives seemed to influence the decision making parallel with each other and the employers most often considered several incentives at the same time when deciding on whether or not to engage in OSH interventions and WHP. In Study II, the average production loss associated with job strain was 8.2% (work environment-related production loss) and 4.3% (health-related production loss). For mild and severe exhaustion the association was 2.0% and 12.7% regarding work environment-related production loss; for health-related production loss it was 5.4% and 17.8%.

## **Conclusion:**

The present thesis contributes to further knowledge of factors that could increase the use of research-based OSH interventions and WHP. The conclusion of Study I was that employers’ decisions to engage in OSH interventions and WHP were influenced by several incentives. Some incentives led to a desire to engage in these kinds of interventions, while other incentives were related to other aspects such as the characteristics of the employer, the provider, and the intervention. All incentives seemed important to consider in order to understand the decision making process for OSH interventions and WHP, and to bridge the gap between what is produced through research and what is used in practice. The conclusion of Study II was that work-related stress, measured as job strain and exhaustion, was associated with increased production loss at the workplace resulting in economic consequences for the employer. If employers would be able to reduce the proportion of employees experiencing job strain and/or exhaustion, this could have a positive effect on work productivity and efficiency, and thereby be used as an economic incentive to reduce work-related stress.

## LIST OF SCIENTIFIC PAPERS

- I. Martinsson, C., Lohela-Karlsson, M., Kwak, L., Bergström, G., Hellman, T.,  
What incentives influence employers to engage in workplace health  
interventions? 2016 vol. 16 (854): p. 1-12. DOI 10.1186/s12889-016-3534-7.
- II. Martinsson, C., Björklund, C., Jensen, I., Bergström, G., Kwak, L.,  
Hellman, T., Lohela-Karlsson, M., Is work-related stress associated with  
production loss at the workplace?  
*In manuscript.*

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## LIST OF ABBREVIATIONS

AIS	American Institute of Stress
EU-OSHA	European Agency for Safety and Health at Work
CFIR	Consolidated Framework for Implementation Research
ERI Model	Effort-Reward-Imbalance Model
GDP	Gross Domestic Product
GLM	General Linear Model
JD-CS Model	Job Demand-Control-Social Support Model
JD-R Model	Job Demand-Resources Model
ILO	International Labour Organization
OECD	Organisation for Economic Co-operation and Development
OSH	Occupational Safety and Health
SWEA	Swedish Work Environment Authority
WHP	Workplace Health Promotion
QOL	Quality of Life



# 1 BACKGROUND

## 1.1 WORK-RELATED ILL HEALTH, A GLOBAL PROBLEM

Work-related ill health is a significant problem for individuals, employers and societies around the world. Work-related ill health is any health condition caused, or made worse, by your job [1]. This can include sudden injuries, such as a slip or 'slow' injuries, such as the development of repetitive strain injury or the ill health effects of stress at work [1]. For the affected individual both financial problems, health problems, the possible risk for stigmatization [2, 3], and the risk for a reduced quality of life (QOL) [4] are evident. Besides the individual consequences of work-related ill health there are also consequences for the society and the employer, such as the economic burden on public health-care systems, social welfare systems due to disability pension and sick leave costs, occupational safety and health (OSH) practices due to rehabilitation costs, and the negative economic effects of presentism, absenteeism, and turnover at the workplace [4-6].

It has been estimated that work-related accidents and illness on a global level cause more than 2 million people their lives each year and that 317 million people suffer from work-related injuries [4]. The economic costs of work-related accidents and illness have been calculated to account for between 1.8% and 6.0% of the gross domestic product (GDP) in country estimates depending on the country, with the average being 4% on a global basis, and these numbers are slowly increasing [7, 8]. An estimation of the cost for Sweden, using the average cost of 4% and the GDP from 2015 [9], indicates that the cost of work-related accidents and illnesses would be about 19.7 billion U.S. dollars. With the same type of calculation, year and currency, the cost for Norway would be 15.5 billion U.S. dollars, 11.8 billion U.S. dollars for Denmark, and 9.2 billion U.S. dollars for Finland. In the United States it has been estimated that work-related accidents and illnesses among the population costs approximately 250 billion U.S. dollars a year on a national basis [10]. An important issue to point out regarding country estimates of work-related deaths, work-related ill health cases, and associated costs are that the comprehensiveness and quality of this data varies considerably between countries making it difficult to compare these figures directly [4, 11]. However, it can be noted that the magnitude of these problems are significant [4, 11] and that better knowledge and ability to prevent work-related ill health and promote health among employees have the potential to overcome some of these problems and contribute to sustainable organizations and societies.

### **1.1.1 Work-related mental ill health**

In Europe a major share of the work-related ill health problems consists of work-related mental ill health [12-15], with work-related stress being the second most frequently reported work-related health problem [16]. About 50-60% of all lost working days in Europe have been estimated to be attributed to work-related stress and these figures are likely to increase [16]. In Sweden mental ill health currently accounts for about 40 percent of all ongoing sick leave and is today the most common cause of long-term sick leave in Sweden [14]. Mental ill health accounts for more than 7.8 billion U.S. dollars of the Swedish economy every year through lost productivity, social benefits, and healthcare [14]. The societal costs of work-related stress in Sweden has been estimated to be approximately 700 million U.S. dollars a year [11]. The problem is also very prevalent in other parts of the world [17]. As an example, there are numerous studies showing that work-related stress is the major source of stress for American adults and that it has increased over the past decades [18]. For example, 65 percent of U.S. employees cited work as a significant source of stress and more than one-third of the working population reported chronic work-related stress [18]. In all, the American Institute of Stress (AIS) estimates that work-related stress costs the U.S. industry more than 300 billion U.S. dollars a year in absenteeism, turnover, diminished productivity, and medical, legal and insurance costs [18].

### **1.1.2 Definition of work-related stress**

Stress is seen as an ‘umbrella concept’ where many different topics have been studied [19]. A widely accepted definition of psychological stress is: “A relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” [20]. Psychological stress can be experienced as both positive and negative for the affected individual, occur in different situations of life, and be a personalized phenomenon that can vary between different persons in equal situations for different reasons [4, 21]. Psychological stress is the first sign of a possible problem and can exacerbate into acute or chronic damages to the body systems and organs, particularly if the body cannot rest and recover [19]. In this thesis stress will only be considered as having a negative impact for the affected individual within the framework of the workplace [4, 21]. Work-related stress refers to the relationship between a person and his or her occupational environment in which the requirements of the occupation exceed the person’s mental and physical resources and are perceived as threatening or even harmful [4, 16, 20-22]. Work-related stress arises when the individual workers knowledge and abilities to cope are not

matched with the demands of the job and expectations of the organizational culture of a workplace [4, 16, 21]. Workplace factors that can cause work-related stress are called psychosocial hazards and are found in the work organization, work design, working conditions, and the social relations at the workplace [4, 16, 21]. Work-related stress becomes a health risk when the situation persists over time [4, 16, 21], which could result in exhaustion. The latter is often referred to as a reaction of long-term exposure of work-related stress, which can also lead to other emotional disturbances, behavioral problems, biochemical and neuro-hormonal changes, and presenting added risks of mental or physical illness [4, 16, 21]. Besides the impact on workers' health and well-being, work-related stress can result in increased absenteeism, presentism, and turnover at the workplace [4, 21].

Some of the most established theories of work environment-related exposures that can lead to work-related stress are the Job Demand-Control-Social Support (JD-CS) Model, the Effort-Reward-Imbalance (ERI) Model, and the Job Demand-Resources (JD-R) Model. The JD-CS Model is based on the idea that the effects of psychological job demands on employees, along with control over work and accessibility to social support, together affect the experience of work-related stress [23]. The Effort-Reward-Imbalance Model has, on the other hand, the basic idea that there must be a mutuality in the work situation where the employee's effort at work needs to be rewarded materially, socially, and individually [24]. The JD-R Model suggests that strain is a response to imbalance between psychological job demands on the employee and the resources this person has to deal with those demands [25].

## **1.2 ENGAGEMENT IN OSH AND WHP AT THE WORKPLACE**

The magnitude of work-related ill health in the world with its consequences makes it imperative to prevent the negative development of work-related ill health and to promote health. Also, if the aim of any country or workplace is sustainability and growth one of their primary objectives ought to be to create a safe and healthy working environment in order to achieve a healthier working population with reduced work related ill health. Governments and employers often say that they are dedicated to improve safety and health at work [4], but it is often difficult to see this stated commitment being translated into a practice that gives effective results [4]. One way to achieve a healthier working population with reduced work-related ill health and increased health are through research-based OSH interventions and WHP [26]. OSH interventions aim to prevent hazards in the workplace that could impair employee health [11], whereas WHP interventions are interventions that aims to improve the

health and well-being of people at work [27]. OSH and WHP interventions can be seen as complementary to each other and are both needed to achieve a healthier working population, since the former aims at preventing ill health and the latter aims at promoting health [27]. Current research on the effects of OSH and WHP interventions varies depending on the targeted problem [28, 29]. However, there is research showing that there are effective ways to prevent ill health [26] and to promote health [30] at the workplace. Although these interventions are available, there is a gap between what is produced through research and what is often used by employers [31]. There are several reasons for the gap between research and practice pointed out in the literature; for instance, the difficulty in applying and adapting the results from research on ,e.g., the individual worker or the specific workplace [31].

Employers' different responsibilities and duties to protect employee safety and health at work are also regulated by legal requirements in countries around the world [32]. The design and scope of the legal requirements varies comprehensively and some countries have more extensive legislation than other countries [32]. Although countries with extensive OSH legislation exist, there still seems to be high costs related to work-related ill health and also shortcomings in the working environment of these countries. As an example, there are legal requirements regarding systematic work-environment management in the provisions of the Swedish Work Environment Authority (SWEA). These addresses the employer's obligations to investigate, carry out, and follow up activities in such a way that ill health and accidents at work are prevented and a satisfactory working environment is achieved. However, in a report from SWEA, it emerged that despite legal requirements, there are still employers in Sweden who are not fulfilling their legal obligations [33].

The above reasoning indicates that research-based OSH interventions, WHP and legislation alone is not enough, pointing out that employers need additional incentives in order for them to increase their engagement in research-based OSH interventions and WHP at the workplace.

### **1.3 INCENTIVES FOR THE EMPLOYER TO ENGAGE IN OSH AND WHP**

#### **1.3.1 Definition of incentives**

In this thesis the term incentive is referred to as a factor that stimulates a certain activity. Incentives can be both positive and negative with people, pulled towards activities that offer positive incentives and pushed away from activities that are associated with negative

incentives [34]. Incentives can also be intrinsic and extrinsic; intrinsic incentives refer to an action that is performed for its own value, for example, happiness or excitement [34-36]. While extrinsic incentives, on the other hand, refer to an action taken in order to obtain or avoid an outcome, for example, to obtain improved efficiency at the workplace or to avoid production loss. The term can be applied to both individuals and groups and what constitutes as an incentive can differ from one situation to another, all depending on the importance the individual or group places on the specific incentive at the time [35].

### **1.3.2 Research on employers incentives for OSH and WHP**

In order to give employers incentives for engagement in research-based OSH and WHP interventions, it is imperative to find out what incentives that govern when employers make decisions about engaging in these interventions at the workplace. In other words, what incentives govern when the employers make the decision of ordering these services or not? Taking the employer's perspective into account when researchers are developing OSH interventions and WHP, and also when suppliers are trying to sell these services, will make the interventions more adjusted to the employer's needs and increase the likelihood that the interventions will be engaged in and further on be more useful. This could lead to health benefits for the employees who are more likely to get access to interventions aimed at preventing ill health and/ or promoting health.

Studies have shown that knowledge about the employer's incentives to engage in OSH and WHP interventions is scarce and seldom is taken into account in the development of OSH interventions and WHP today [31, 37-40]. There are only a few international studies that have investigated the employer's perspective regarding incentives for OSH interventions and WHP. A British study examined why managers in the British industry spend money on employee health and found that legal requirements, economic incentives, moral and ethical aspects were the most important incentives to engage in interventions [39]. The study also showed that it would also require more empirical "business cases" with reported data on costs of illness and return-on-investment calculations to attract the employers to engage in employee health activities [39]. A Canadian study examined what factors that increase a manager's spending on WHP programs within the auto parts industry [38]. The managers were primarily motivated by their beliefs that WHP programs reduce indirect costs of ill health, and they also felt a responsibility towards the employees. Business cases were also pointed out as important. Another study has explored the process by which OSH decisions

are made and the importance given to the financial implications of OSH interventions within the Canadian health-care sector [40]. Information on the financial implications of OSH interventions was found of great importance, especially the employer's costs and benefits. EU-OSHA did an extensive literature review on the employer's incentives for carrying out WHP [41] and found the following as important evidence, indicating that:

- Poor employee health and well-being are linked to the increased likelihood of industrial accidents and injuries.
- WHP has a positive impact on presenteeism, decreasing absenteeism and therefore leads to significant cost savings.
- WHP has an effect on increasing productivity rates and production.
- WHP contributes to enhanced job satisfaction, commitment among workers and reduces staff turnover, and improves the recruitment of new workers.
- WHP leads to indirect benefits of improved customer service and customer loyalty.

The review also identified barriers and challenges that may have an impact on employer's engagement in WHP [41]. These included lack of WHP infrastructure, lack of relevant skills and qualifications, a negative perception of WHP requirements and benefits, inadequate cooperation between key stakeholders in the process, bureaucratic requirements, the perceived need for major financial investment in a program, the misperception that WHP has limited or no benefits for the company, that WHP is too time-consuming, and WHP is not the employer's responsibility.

The way OSH interventions and WHP is managed in the workplace varies significantly from one country to another, as well as by industry sector and organization size [42]. The above-mentioned studies have been conducted within Britain, Canada and the review have included different studies from different parts of the world. Limitations of the current research regarding employer's incentives for OSH interventions and/ or WHP have been pointed out as being restricted to, for example, small sample sizes, single industries, single regions, or certain countries [38-40]. Recommendations for future studies have been to explore to what extent the findings are generalizable, as well as highlighting the importance of exploring these issues in different contexts. The three first-mentioned studies in this paragraph [38-40] have had their main focus on what motivates employers to engage in OSH interventions and/or WHP at a specific workplace, leaving out other factors, i.e., negative incentives that may affect the employer to opt out of these interventions. The literature review from EU-



OSHA [41] approaches this angle, but only by meta reflecting on the results of earlier conducted research not aiming at this topic directly. No study has explicitly investigated what incentives make employers engage in OSH interventions and WHP, and what negative incentives make them to opt out these interventions by asking them questions about this topic directly.

#### **1.4 ECONOMIC INCENTIVES AND WORK-RELATED STRESS**

As mentioned above economic incentives have been identified as an important incentive for employers to engage in OSH interventions and WHP, since employers often use economic calculations to support decisions about these interventions at the workplace [38-41, 43]. This points out a need for knowledge on the economic consequences of work related stress, since work related stress constitutes a major part of the work related ill health problems to day. An important outcome when considering the economic consequences of work related stress from an employer perspective is production loss at the workplace, as work related stress might result in production loss due to reduced production while being at work affected by this state. Production loss is defined as the difference between an employee's regular performance and his or hers performance while affected by a problem, for example, work-related stress [6]. Despite the need for knowledge about economic consequences to support employers in their decisions, the knowledge about the relation between work-related stress and production loss seems to be limited [44, 45].

There are only a few studies on the association between work-related stress and production loss. One measured the association of work-related stress and other types of stress with production loss [46]. The results of this study revealed that stressors from home, work, and finances were significantly associated with production loss, which was measured on a scale asking for number of days with decreased productivity during the past four weeks. The level of reduced performance during these days was not assessed. Without information about the levels of reduction, it is not possible to estimate the cost of production loss to the employer. One must be able to measure how much performance has been reduced for a limited period of time to be able to estimate this cost. By only using yes or no questions, or to ask about the number of days, leaving out how much performance was affected on those days, you can only capture that there has been production loss but not how much. Another study [6] that investigated the association between health and production loss, of which long-term consequences of stress was included as one of the health factors, had the shortcoming of only

measuring work-related stress as exhaustion and only including participants that reported work environment problems and/or health problems in the previous seven days. It is possible that employees reporting work-related stress do not perceive themselves as experiencing either work-environment problems or health-related problems, leaving out a perhaps large and relevant population that have had production loss due to work-related stress. In addition to the studies regarding the association between work-related stress and production loss, there are a number of studies on stress and production loss [45, 47-50]. In most cases these studies have found that increased stress is associated with increased production loss [45, 47-50]. These studies are limited regarding work-related stress, its effect on production loss, and costs due to the fact that they do not study work-related stress and/or that they do not measure production loss using instruments that allow for economic calculations. To provide economic incentives to engage in interventions targeting work-related stress, there is a need for studies that investigate the association between work-related stress and production loss, as well as calculating the economic consequences of work-related stress to the employers.

## **2 AIM**

The overall aim of this thesis is to extend the knowledge of factors that from an employer's perspective could increase the use of research-based OSH interventions and WHP.

### **2.1.1 Study I: What incentives influence employers to engage in workplace health interventions?**

The aim of Study I was to explore and describe the employer perspective regarding what incentives influence their decision to engage in OSH interventions and WHP at the workplace.

### **2.1.2 Study II: Is work-related stress associated with production loss at the workplace?**

The aim of study II was to examine if work related stress is associated with production loss through measures that are quantifiable. The research questions were as follows:

1. Is work-related stress associated with work environment-related production loss?
2. Is work-related stress associated with health-related production loss?

## **3 METHODS**

### **3.1 DESIGN**

#### **3.1.1 Study I**

In Study I, a qualitative design with in-depth, semi-structured, focus group interviews have been applied [51]. Qualitative research is based on participants' varieties of perception. It provides understanding and description of different phenomena and is useful when gathering new information within areas where there is a lack of knowledge [52]. Focus groups are semi-structured interview sessions and discussions with groups of people that aim to explore a specific set of issues [51]. It is recommended to have smaller focus groups when participants are expected to have a great deal to say about the topic; or large when the participants' engagement is expected to be low; or when the interview questions are closed and lead to short answers [51]. The interview method focus group is built on the conception that the interaction between the responders, rather than to have only one respondent, accumulates their consciousness and ability to explore and clarify individual and shared perspectives [53]. Focus group interviews are often used to explore views on health issues, program interventions, and research [54]. This research design was chosen because of the lack of knowledge regarding the objective of the study [31, 37-40] and our interest in gathering a broad range of information regarding this subject. The reason for a broad range is in order to get a general understanding of the subject where there yet is little known and to avoid the data to be specific for only one participant, employer, or industry.

#### **3.1.2 Study II**

In Study II, a cross-sectional study design has been applied and data was collected through a work environment and health survey. The reason for using this design was to enable investigation of the direct association between stress and production loss, which was necessary to be able to count on the costs of stress-related production loss for the employer.

### **3.2 SAMPLE**

#### **3.2.1 Study I**

In Study I, the study population was managers with responsibility for making decisions about OHS interventions and WHP, or employees directly involved in this work with equivalent knowledge and a mandate from their managers to answer questions about these decisions.

The managers and employees had their origin in different economic sectors. The inclusion criteria were: working in large or medium workplaces and having at least six months' experience of working at their current workplace.

Purposive sampling was used to include participants in the focus groups, because this sampling method aims to target individuals that have experience of and can offer specific information to the researchers regarding the objective of their study [55]. The participants in the focus groups were selected one after the other to ensure a variation regarding workplaces and economic sectors. The reason for having a population sample from various workplaces and economic sectors was to reach the desired broad range of information regarding the objective of the study, not only having participants giving information of the situation in one type of workplace and/or economic sector.

About one hundred seventy participants were located through corporate websites, work-related contacts, and snowballing [51] which is when different contacts are asked whether they know possible participants who they think could provide relevant information [55]. The participants were informed about the study, how it would be carried out, and the possibility to participate by e-mail. To make the participation easily accessible, they were given the option to have the focus group in their home town or nearby. The participants were also informed that they could withdraw from the study at any point, without stating why.

About forty persons were interested in participating but twenty were unable to participate for different reasons such as being unavailable the same dates as the other participants in the focus groups, sudden impediment the day of the interview, and/or not being able to leave work because of workload. At the end, twenty participants partook in the focus group interviews. There were five groups consisting of a varied number of participants ranging from two to five. The participants represented employers with employees throughout the country. However, the head offices where the decisions were made were mostly located near the two large cities Stockholm and Uppsala in central Sweden. Represented industries from across Sweden were municipalities, government agencies, military, educational, research and development institutions, health care, manufacturing, agriculture, and commercial services. Tables 1 and 2 give an overview of the characteristics of the participants in the study.

Table 1. Working titles of the participants in the study

Working titles	Participants n=20	%
CEO	1	5
Staff executives	2	10
Occupational health executive	1	5
HR executives	5	25
HR business partner	1	5
HR specialists	4	20
OHS specialists	2	10
Health strategists	3	15
Staff administrator	1	5

Table 2. Characteristics of the participants in the study

Variable	Participants (n=20)
Gender ( <i>female/male</i> )	17/3
Sector ( <i>private/public</i> )	12/8
Years of total working experience with OHS: <i>mean (SD)</i> <i>range</i>	15.50 (9.20) 2-34
Years of working experience at current employer and position <i>mean (SD)</i> <i>range</i>	6.40 (4.5) 0.29*-20
Number of employees at the represented workplaces <i>mean (SD)</i> <i>Range</i>	4,780.50 (4,747) 260-1,7000

\* One participant had worked at her current workplace for less than six months, but her total experience of working with the issues in question was ten years.

### 3.2.2 Study II

The study population in Study II was employees at a Swedish municipality in the southern part of Sweden. Inclusion criteria for being invited to answer the questionnaire were having been employed for at least six months and with an employment grade of least 50% percent (n=2,766).

### **3.3 DATA COLLECTION**

#### **3.3.1 Study I**

The focus group interviews were held between March and September 2014 in the two cities, Stockholm and Uppsala in Sweden. All interviews were prepared with an interview guide with a set of open questions regarding the objective of the study, setting a frame that allowed new information to emerge for exploration of the chosen subject [51]. The interview guide included definitions of key terms (i.e., OSH interventions, WHP, and incentives), questions about incentives for OSH interventions and WHP, and other experiences relating to the subject. Before each interview, the researchers who conducted the interviews had breakfast or lunch with the participants so the participants would have the opportunity to get to know each other better with the aim of getting them to be more comfortable and relaxed in the interviews [51]. The participants were also asked to read and sign an informed consent form and a short descriptive demographics and background form before the interviews started. The informed consent form included purpose of the study, method of data collection and analysis, presentation of the results, confidentiality, voluntariness, and the right to abort the participation at any time. The five different interviews lasted between 83-124 minutes. The interviews were digitally recorded and transcribed verbatim. The interviews were held by two researchers with different tasks; one was responsible for moderating and the other was to observe the interviews. The reason for having one of the researchers to observe was to make sure that the moderator let all the participants interact equally and not miss in-depth questions on important statements by the participants [51].

#### **3.3.2 Study II**

##### *The survey*

The survey was conducted in 2014 and was part of the occupational safety and health activities in that municipality at the time and was conducted at one occasion. The questionnaire included validated questions on psychosocial work-environment factors, health conditions, lifestyle, and production loss [56]. Participation was voluntary but the employees were encouraged by their management to participate, and they had the possibility to answer the survey during working hours. The invitation in Study II was sent by e-mail and included information about all answers being anonymous to the employer and being collected and summarized by an external consultant. In those cases when the invitation was unrequited by the employees, this was followed up with two reminders. The participating employees signed a written informed consent form before participating in the survey. The informed consent

form included confidentiality, voluntariness, the right to abort the participation at any time, and information pointing out that the unidentified answers could be used by the Karolinska Institutet in research on work and health.

### *Explanatory variables*

The explanatory variables in Study II were job strain [57] and exhaustion [58], which were used to measure work-related stress. Both job strain and exhaustion were included as measures to capture the consequences of the experience of short- and long-term stress at the workplace.

Job strain has been widely used as an estimate of stress at work [23] and was measured using the validated questionnaire QPS Nordic [57]. In QPS Nordic, job strain is defined according to the JDC-model [23] (i.e., as a combination of high demands and low control) and consists of the four following areas: quantitative job demands (4 items), qualitative job demands (3 items), work decisions (4 items), and work pace (4 items) [57]. Examples from these questions in the area “work decisions” are: “Can you influence decisions that are important for your work?” All of the responses are scaled on a 5-point Likert scale with response categories ranging from “very seldom or never” to “very often or always.” In the analysis of Study II, the study population was divided into having job strain or not by using the median values of job demands and job control in the current population. Employees with values above the median for job demands and below the median for job control were defined as having job strain.

Exhaustion is commonly used as a measure of long-lasting exposure of work-related stress [58] and to capture exhaustion. The Swedish version of the validated screening instrument Oldenburg Burnout Inventory (OLBI) [59, 60] was used. The instrument is widely used to capture exhaustion and consists of eight questions with four answers that generate different number of points. The response alternatives are summarized to provide a number between 8-32 [59, 60] and are used to sort the respondents into three different categories: 8-17.59=no exhaustion, 17.60-21.99=mild exhaustion, and 22-32=severe exhaustion [61-63].

### *Outcome variables*

Outcome variables in Study II were both work environment-related production loss and health-related production loss. The reason for having these two measures of production loss is that problems in the work environment, for example, job strain, could be stressful



causing production loss without being perceived as a health problem, or before being perceived as a health problem, and that exhaustion primarily could be perceived as a health problem to the affected individual and not a work environment-related problem. Also, earlier conducted research has shown that production loss due to problems in the work environment was higher than the production loss caused by health problems [6]. These point out the importance of using both production loss measures when trying to avoid underestimation of the total amount of production loss due to work-related stress.

A validated question capturing work environment-related problems effect on work performance the past seven days [6, 64] was used to collect data on work environment-related production loss. Response options ranged from 0 to 10, where 0=Work environment problems had no effect on my work and 10=Work environment problems completely prevented me from working. The scale was converted from 0-10 to 0–100 for the percentage on loss of work time. In the survey, work environment problems are defined for the participant as any physical, psychological or social problems that resulted from the work environment and the stated question was formulated as follows: “During the past seven days, how much did your work- environment problems affect your performance while you were working? Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If work-environment problems affected your work only a little, choose a low number. Choose a higher number if work-environment problems affected your work a great deal.”

A validated question [64, 65] capturing the effect of health-related problems on work performance the past seven days was used to collect data on health-related production loss. Response options ranged from 0 to 10, where 0=Health-related problems had no effect on my work and 10=Health-related problems completely prevented me from working. The scale was converted to 0–100 for the percentage on loss of work time. The question was based on one of the items in the Work Productivity Activity Impairment questionnaire (WPAI-GH) [66] and was formulated as follows: “During the past seven days, how much did your health problems affect your performance while you were working? Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If health problems affected your work only a little, choose a low number. Choose a high number if health problems affected your work a great deal.”

### *Confounders*

Numerous studies have pointed out that different aspects of the work environment and the employee's health status can cause production loss at the workplace due to reduced work performance [45, 47, 64, 67-69]. Those factors that have shown to be associated with production loss in these studies were included as confounders in the analyses of Study II [45, 47, 64, 67-69]. These confounders were:

- Background and demographic data including age, gender, and education level.
- Lifestyle-related factors, such as body mass index (BMI), and smoking [45, 47].
- Work-related factors such as role clarity, social climate, fair leadership, and well-functioning leadership from the nearest manager [57].
- Experienced work environment-related or health-related problems the previous seven days [6, 64].

Work-related factors were measured using the validated questionnaire QPS Nordic [57]. To capture work environment problems, all employees were asked whether they had experienced any work environment related problems in the previous seven days. Work environment problems were defined as any physical, psychological or social problems that resulted from in the work environment. Response options were yes/no. Employees who answered "yes" were defined as having work environment problems. To capture health problems in the population, all employees were asked the following question: "Over the past seven days have you experienced any health-related problems, but nevertheless chose to go to work?" Health problems were defined as any physical or mental health problems or symptoms. The response options were yes/no. Employees who answered "yes" were defined as having health problems.

## **3.4 ANALYSIS**

### **3.4.1 Study I**

In Study I, a latent content analysis was used to analyze the data [70]. One person performed the steps one to six on all the interviews (see Table 3). The other person performed step one to six on the first interview, in addition to reading and asking new questions regarding the rest of the material, and presenting alternative ways to interpret and understand the data. During the whole procedure described above, the researchers went back and forth reading the transcribed interviews to make sure that the results did not lose their meaning in relation to the original context. After these steps were performed two more researchers were involved in

reading the material, asking inquiring questions about it, and ensuring that the analyses could be argued for. The research team was inter-professional. See Table 3 for step one to six in the analysis and Table 4 for an example of the transcribed interview data being processed into categories.

Table 3. Step one to six in the analysis

<b>Step 1</b>	<b>Step 2</b>	<b>Step 3</b>
All transcribed interviews (221 pages) were read through several times to get to know the content and obtain a sense of the whole.	The content in each interview that related to the objective were highlighted and condensed into meaning units, i.e., the highlighted text was summarized into shorter notes.	The condensed meaning units were then abstracted, i.e., interpreted regarding explicit meaning and/or possible underlying meanings and given codes, i.e., a title relating to the interpretation.
<b>Step 4</b>	<b>Step 5</b>	<b>Step 6</b>
The condensed meaning units and codes for each transcribed interview were then listed in separate MS Word documents to see if the condensed meaning units and codes within each separate document were linked to each other focusing on the same thing.	The related codes within each separate document were then organized and merged into categories and sub-categories; see Table 4 for an example of categories and sub-categories.	All the interviews were then compared with each other to see if the categories and sub-categories were linked to each other and focused on the same thing. The ones that did were merged together and the others were kept as they were, resulting in categories and sub-categories.

Table 4. An example of the transcribed interview data being processed into categories

<b>Meaning unit</b>	<b>Condensed meaning unit - Description close to the text</b>	<b>Condensed meaning unit - Interpretation of the underlying meaning - Code</b>	<b>Sub-category</b>	<b>Category</b>
Our goal has been to reduce the number of sickness absence days, so that the employees can get back earlier from their sick leave. This has a great deal to do with money of course.	Interventions to reduce sickness and absence days have to do with money.	Interventions to avoid costs.	Preventing negative consequences.	Consequences for the workplace.

### 3.4.2 Study II

All statistical analyses were conducted using the statistical software SPSS version 22. The association between work-related stress and production loss was conducted by a general linear model (GLM) regression analysis (Steps 1-3) and by a mixture of backward and forward selection (Step 4). The reason for using both models was to avoid failure in identifying the most significant combination of explanatory variables and confounders. Each

step, as described below, was conducted separately for the explanatory variables job strain and exhaustion. In Step One, the association between the explanatory variables and production loss was tested for. In the Second Step, separate regression analyses were conducted for each of the confounders that in previous studies have shown to be associated with production loss together with the explanatory variables. If the confounder did not reach significance in this step (95% confidence interval), it became excluded in the further analyses. In the Third Step, all confounders that in the Second Step found significant were all together included in the regression analyses Non-significant (95% confidence interval) confounders were removed step by step until only significant confounders remained. In Step Four, a mixture of backward and forward selection was used to identify the most significant combinations of explanatory variables and confounders. The selected combination among these that were significant and equivalent were the ones that were equal to the results of the GLM.

As the self-report measures of both work environment-related production loss and health-related production loss ranged from 0-100 and represented production loss the past seven days, the beta coefficient could be used as the percentage difference in production loss compared to the reference category enabling calculations of lost working hours per week. All of the significant beta coefficients were therefore used to quantify the results of Study II. These calculations were conducted the following way:  $\beta$  (i.e., percentage loss of work time per week) x 40 hours work week=loss of working hours per week.

## **3.5 ETHICAL CONSIDERATIONS**

### **3.5.1 Study I**

The study has been reviewed by the Swedish Ethical Review Board, who determined that the research does not involve the processing of personal data referred to in the Ethical Review Act, therefore is not covered by the regulation. For this reason the Ethical Review Board deemed that the study did not require ethical approval (reference no. 2014/58-31/5).

### **3.5.2 Study II**

The study was approved by the Swedish Ethical Review Board (AHA; Dnr 00-012 and 2017/42-32).

## 4 RESULTS

### 4.1.1 Study I

The results in Study I describe the employer's incentives for OSH interventions and WHP and how these incentives influence the decision making regarding whether or not to engage in these types of interventions. The analysis identified a variation of incentives that influence the decision making, and the participants stated that there are several different incentives that effect the decision on engaging or not. Also, the findings showed that what worked as incentives for some participants did not necessarily work as incentives for others; e.g., for some participants the incentives have been clear and well thought through, while other participants just briefly reflected on the incentives, describing that they did not know enough about OSH interventions and WHP to have clear incentives about this. The identified incentives in the analysis have been divided into five categories and nine sub-categories (Table 5).

Table 5. Incentives for OSH interventions and WHP

<b>Laws and regulations</b>
<b>Consequences for the employer</b> Preventing negative consequences Promoting positive consequences
<b>Knowledge of worker health and workplace health interventions</b> (Lack of) Knowledge of worker health and workplace health interventions (Lack of) Knowledge of worker health and workplace health interventions on the part of the provider
<b>Characteristics of the intervention</b> Evidence-based research or successful examples Measurable effects Easy to perform and easy to understand
<b>Communication and collaboration with the provider</b> Responsiveness and adaption to the workplace goals, needs and culture Feedback

#### *Laws and regulations*

Participants described laws and regulations as an incentive, which influenced the decisions regarding whether or not to engage in OSH interventions and WHP. They described how they most often engage in OSH interventions and WHP stated by law or mentioned in the regulations. Partly because it is considered as a given to follow the law, also making it easier to justify and obtain the managements' agreement and financial support for these

interventions, but also to avoid conflicts with interest groups and trade unions. However, the participants often felt that the interventions covered by law only covered a minimum of what could be done at the workplace to promote health and to prevent work-related ill health, expressing that workplaces do not put the same resources on interventions that lack legal support:

*“Everything that has legal support when it comes to rehabilitation and work environment rolls on, well, we are home here... But it’s the other parts that are limping” (Focus Group 2).*

#### *Consequences for the employer*

Participants also brought up the two sub-categories: *prevention of negative consequences for the employer* and *promotion of positive consequences for the employer* as incentives.

Prevention of negative consequences was mentioned as avoiding unnecessary costs.

Participants described that short-term and long-term sickness absence resulted in high costs to the workplace and therefore worked as an incentive for decisions on engaging in OSH interventions and WHP. Participants also considered it as important to avoid future costs by paying attention to whether employees were in the risk zone of long-term sick leave and considered OSH interventions and WHP as one way of preventing this:

*“The incentives at our workplace are the economic aspect, that sickness absence costs money, dysfunctional employee groups cost money, staff turnover costs money” (Focus Group 2).*

The sub-category promotion of positive consequences was mentioned in terms of improved sustainability of the workplace, improved production, improved revenue, and non-specified benefits for the workplace. Sustainability of the workplace was described as having sustainable employees being capable of coping with occasional stress and periods of higher workload. Improved production and sustainability of the workplace were often mentioned together, but not always. An example of this is that one of the participants explained that she wanted OSH interventions and WHP to strengthen the brand as an attractive employer in order to attract the most suitable employees for the workplace, hopefully leading to improved production, increased revenue, and sustainability of the workplace. Participants also mentioned improved production and/or increased revenue as incentives, without mentioning them in relation to sustainability. The following quote describes some of this:

*“You must have some form of wellness activity ... you have to be healthy on the job, that’s what they want ... They are not interested in anything other than that people come to work and produce” (Focus Group 1).*

Regarding non-specified benefits for the workplace, participants expressed that they wanted to improve employee well-being believing that it would lead to some sort of benefit for the workplace, even if the exact benefit would be unknown to them. Although, engaging in OSH interventions using employee well-being as a single incentive was brought up as uncommon. The interventions were rather chosen based on other incentives, but employee well-being was seen as a contributing factor in the process of the decision making. It was only one of the participants describing that employee well-being worked as a single incentive at his workplace, but he also explained that the economy at his workplace was so strong that this cost could be spared without detailed economic considerations or calculations:

*“It's a given to us to do something good, without measuring the payoff in monetary terms. Perhaps we can do this because we have a quite lucrative business. We can afford to have this” (Focus Group 4).*

#### *Knowledge of worker health and workplace health interventions*

Further on the participants brought up the two sub-categories: “(lack of) knowledge of worker health and workplace health interventions” and “(lack of) knowledge of worker health and workplace health interventions on the part of the provider” as incentives for OSH interventions and WHP. Regarding the former sub-category, it was found that a major part of the participants who brought up economic incentives and/or other benefits for the employer had prior knowledge on negative consequences of ill health and the benefits of good health. This knowledge could either derive from a colleague or one's own interest in a healthy lifestyle and experiences of physical activity both in private life and working life. They also knew that some of the consequences could be promoted and prevented with OSH interventions and WHP. A participant described the following regarding this subject:

*“If the management takes exercise and has a healthy lifestyle, they will spend more money on health related activities at work. I think that's one of the reasons why we have a health center at our company. That there is a deeper belief in the management that this is something good... They have seen the benefits of exercise and a healthy lifestyle throughout life... You work ... a little better if the body is fit, you can aim a little higher when necessary and also unwind more easily, they're linked to each other” (Focus Group 4).*

Other participants thought that the above-mentioned knowledge was difficult to access and that neither they nor others at their workplaces had this knowledge or outspoken interest. They described that due to a lack of the above-mentioned knowledge and the fact that they

did not know where to obtain it, they often decided to engage in OSH interventions and WHP on a random basis. These decisions could be influenced by, for example, a skillful salesman, a colleague or acquaintance who expressed that an intervention was good without substantiating why, and information on what interventions in other workplaces use or trends: *"Really, it's hard to specify what it is that influence and effect what we are deciding on. We are probably a little bit like -Oops, there's an intervention! Do we have money? Yes, we have. We check some references. Let's go for it!" (Focus Group 2).*

Regarding the sub-category *"(lack of) knowledge of worker health and workplace health interventions on the part of the provider,"* participants described that specialist knowledge on specific targeted areas regarding OSH interventions and WHP on part of the providers gave them incentives. The participants also brought up that they were not interested in engaging in OSH interventions and WHP given by providers who delivered a broad range of interventions such as medical examinations, healthcare, leadership training, and organizational development:

*"When you buy something you want it from a provider that's specialized and absolutely the best in the market at the time. You don't want a provider of everything. When X occupational health service is trying to sell leadership training to me, I think, oh well. Why? Forget it! Then I'll go out and look at the top three providers of leadership training and choose one of them" (Focus Group 3).*

Participants also described it as important that the providers were up-to-date with new research regarding different aspects of health, OSH interventions and WHP. However, a common experience was that providers seldom update their services in accordance with new research. The participants pointed out that research and general knowledge become obsolete in time and that providers who are not adapting to new research will have a decreased trust regarding the ability to perform effective OSH interventions and WHP. One participant said the following regarding this subject:

*"They should (the interventions) feel modern and forward, and not seem obsolete; this is something that gives incentives" (Focus Group 3).*

#### *Characteristics of the intervention*

Further on, the participants brought up the three following subcategories as important when deciding on whether or not to engage in OSH interventions and WHP: *"evidence-based research or successful examples," "measurable effects,"* and *"easy to perform and easy to*



*understand.*” In relation to evidence-based research or successful examples, participants described that interventions, which were proven to be effective, either from research or through examples from other workplaces, worked as incentives. However, these incentives varied among the participants, i.e., some of the participants settled with successful examples from other workplaces, while other participants described that their workplaces only focused on the health areas in which there was evidence-based research available. One of them said that when her workplace needed to reduce the level of long-term stress among the employees, they decided on an intervention they knew from research was effective. If they would not have found a researched-based intervention, they would not have had an intervention at all. Another participant described that her workplace chose to stop using an intervention since no evidence of its effect was available.

The ability to measure the effects of OSH interventions and WHP after implementation was also described as important since employers need to be able to evaluate whether implemented interventions achieved expected results or not. If they cannot do this, they cannot justify any further use of the interventions. It was also seen as important that this effect of evaluation was distributed by the provider of the intervention, since the employers most often do not possess this knowledge themselves. Another thing pointed out was that the request for measureable outcomes sometimes creates problems regarding interventions aiming to improve a psychosocial work environment, since this was seen as difficult to measure. This was suggested as a reason for these interventions not being engaged in, to the same degree, as other types of interventions.

Further on, participants described the sub-category “easy to perform and easy to understand” as an important incentive, explaining that interventions were not engaged in if they were too time consuming to implement and to perform and contained too large amounts of information that were difficult to understand. Participants described that managements generally prioritize activities that contribute directly to the main goals of the workplace over other activities, such as OSH interventions and WHP:

*“What puts a spoke in the wheel, is the practical situation. What do we have time for? Can they (employees) go away? When there are things to be done that are not directly woven into the job, then the time is a big factor” (Focus Group 5).*

#### *Communication and collaboration with the provider*

Communication and collaboration with the provider were described as the two sub-

categories: “*responsiveness and adaption to the workplaces intents, needs and culture*” and “*feedback.*” Regarding the first sub-category, the participants explained it was important that the providers first performed a customer analysis where the workplaces’ culture, intents, preconditions and needs regarding OSH interventions and WHP have been paid attention to, and then provided a tailored intervention. The participants expressed that if they were offered tailored interventions, the incentives to engage in OSH interventions and WHP were much greater, as they felt more secure about the intervention being relevant for the specific workplace. There was an expressed frustration over predefined concepts and general solutions from suppliers only interested in selling:

*“I want an occupational health care that understands... I need them to have specialist knowledge, they have to come in as specialists and read our needs, before they come with their sales pitch” (Focus Group 1).*

Regarding the sub-category feedback, the participants described it as an incentive when the providers present their results during interventions, after interventions and also provide suggestions for additional interventions or solutions of possible problems detected during the performed intervention. There was an expressed frustration of only receiving information from the provider about detected problems without action plans on how to resolve them. However, the participants also said that they themselves needed to get better at expressing their expectations of the suppliers when ordering these services, pointing out that the lack of communication regarding this problem went two ways:

*“It’s very possible that we’re unclear... That we must address this further in order for the suppliers to come back with suggestions for solutions after, e.g., health surveys” (Focus Group 1).*

It was also important for the participants to know how the providers intended to conduct their feedback in relation to confidentiality, which was referred to as being problematic when providers were holding back on sensitive information about individual employees from the employer, only presenting general information and results on a group level. This was seen as problematic since participants felt that the workplaces, as a consequence of this, lost their ability to take their own responsibility for their employees. They meant that they were not able to decide on how to do adequate follow-ups and target interventions without this information, saying that they have chosen to end their collaboration with providers who have not been able to meet their needs on this:

*Participant 1: “If we have a survey amongst the employees and the statistics show that we*

*have 15 people who feel harassed or bullied, we do not know who they are and the providers say something like “We won’t disclose that!” and there are 250 of us in the workplace.”*

*Participant 2: “I cannot see any other industry where you end up in such a dilemma. We have information that there is something crazy going on, we have a provider who is supposed to help us with it, but won’t disclose the information and there is nothing we can do about it”*

*(Focus Group 1).*

#### **4.1.2 Study II**

The results in Study II show the association between work-related stress and production loss. In addition, the production loss was quantified to find economic arguments to the employers to engage in OSH interventions and WHP. There were 2,460 employees that answered the survey (response rate of 89%). However, 9.8% of these respondents did not answer the questions used to measure exhaustion, which resulted in an internal missing. A majority of the employees were women (82%) and had been working six years or more in their current position; see Table 6.

Table 6. Descriptive statistics of the participants in the study

Variable	Participants n=2,460 (%)	
Female	2,020	(82.1)
Male	440	(17.9)
Mean age (SD)	45.8	(11.0)
Educational level:		
Compulsory school	165	(6.7)
High School	1,124	(45.7)
University	1,152	(46.8)
Postgraduate	19	(0.8)
Years in current position:		
< 1 year	171	(7)
1-2 years	232	(9.4)
3-5 years	353	(14.3)
6-10 years	455	(18.5)
> 10 years	1,249	(50.8)
Work environment problems the last seven days (YES)	1053	(42.8)
Health-related problems the last seven days (YES)	886	(36.0)
Work-related production loss, mean (%) (SD)	26.2	(22.4)
Health-related production loss, mean (%) (SD)	24.4	(17.5)

The prevalence of job strain amongst the 2,460 employees was 32.2% (n=791) and no job strain 67.8% (n=1,669). The prevalence of severe, mild and no exhaustion amongst the employees was 17% (n=418), 29.9% (n=734) and 43.3% (n=1,067), with an internal missing of 9.8 % (n=241). The average level of work environment-related production loss and health-related production loss in this population are presented in Table 7. Employees experiencing their jobs as characterized by job strain reported on average higher levels of work environment-related and health-related production loss than employees with no job strain. The average level of production loss among employees experiencing exhaustion was found to increase with the level of exhaustion they were experiencing, i.e., employees with more severe risk of exhaustion rated a higher average level of production loss than those who reported mild or no exhaustion. The same was found for those who experienced mild exhaustion, which rated higher average production loss than those who reported no exhaustion.

Table 7. Mean values of work environment- related production loss and health-related production loss in the study population presented for different measures of work-related stress.

Variable	Work environment-related production loss			Health-related production loss		
	Mean	Median	SD	Mean	Median	SD
Job strain	35.5	30	28.5	24.2	20	26.7
No job strain	16.2	00	22.5	14.4	00	22.6
Total	22.4	10	26.2	17.5	10	24.4
Severe exhaustion	43.8	50	28.1	37.0	30	27.2
Mild exhaustion	24.1	20	23.8	18.7	10	22.8
No exhaustion	12.4	00	20.8	8.6	00	18.6
Total	22.2	10	26.1	17.3	10	24.2

The association between work-related stress and production loss were first assessed using a general linear model (GLM) analysis. Job strain, mild exhaustion and severe exhaustion were shown to be associated with both work environment-related production loss and health-related production loss when included as separate independent variables. After control for confounders conducted through a mixture of backward and forward selection, the significance remained for all of the three variables (Table 8). Employees experiencing their jobs as characterized by job strain reported 8.2% (CI 6.3–11.0) higher work environment-related production loss than employees in jobs not characterized by job strain (Table 8, Model

1). Employees experiencing mild exhaustion and severe exhaustion had 2.0% (CI 0.1–3.9) and 12.7% (CI 10.1–15.3) higher work environment-related production loss compared to employees experiencing no exhaustion (Table 8, Model 1). Further on, employees experiencing job strain had 4.3% (CI 2.3–6.3) higher health-related production loss compared to employees with no strain (Table 8, Model 2). Employees experiencing mild exhaustion and severe exhaustion had 5.4% (CI 3.5–7.4) and 17.8% (CI 14.3–21.2) higher health-related production loss compared to employees experiencing no exhaustion (Table 8, Model 2).

Table 8. Association between work-related stress and work environment-related production loss (Model 1) and health-related production loss (Model 2).

Variable	Model 1 Adj R <sup>2</sup> = 0.452		Model 2 Adj R <sup>2</sup> = 0.232	
	$\beta$	CI	$\beta$	CI
Job strain	<b>8.2<sup>1</sup></b>	<b>6.3–11.0</b>	<b>4.3<sup>3</sup></b>	<b>2.3–6.3</b>
No job strain	0 <sup>a</sup>	-	0 <sup>a</sup>	-
	Adj R <sup>2</sup> = 0.455		Adj R <sup>2</sup> = 0.283	
Severe exhaustion	<b>12.7<sup>2</sup></b>	<b>10.1–15.3</b>	<b>17.8<sup>4</sup></b>	<b>14.3–21.2</b>
Mild exhaustion	<b>2.0<sup>2</sup></b>	<b>0.1–3.9</b>	<b>5.4<sup>3</sup></b>	<b>3.5–7.4</b>
No exhaustion	0 <sup>a</sup>		0 <sup>a</sup>	

CI = 95% confidence interval, significant values in bold.

0<sup>a</sup> Referent category

<sup>1</sup>Controlled for: educational level, work environment-related problems, fair leadership, health-related problems, role clarity, social climate

<sup>2</sup> Controlled for: work environment-related problems, fair leadership, health-related problems, role clarity, social climate

<sup>3</sup> Controlled for: work environment-related problems, fair leadership, health-related problems, role clarity

<sup>4</sup>Controlled for: work environment-related problems, fair leadership, health-related problems, age

As the scale of both work environment-related production loss and health-related production loss ranged from 0-100, the beta coefficient could be used to capture the percentage loss of work time per week, which also enabled calculations of lost working hours per week (Table 9). Regarding work environment-related production loss, employees experiencing job strain reported 3.3 lost working hours per week and employees experiencing severe exhaustion reported 5.1 lost working hours per week (Table 9). Health-related production loss resulted in 1.7 lost working hours per week amongst employees experiencing job strain and 7.1 lost working hours among employees experiencing severe exhaustion (Table 9).

Table 9. Production loss converted into lost working hours per week: percentage loss of work time per week i.e.  $\beta \times 40$  hours work week=loss of working hours per week

Variable	Work environment-related production loss		Health-related production loss	
	$\beta$	Loss of h./W	$\beta$	Loss of h./W
Job strain	8.2 i.e., 0.082*40		4.3 i.e., 0.043*40	
No job strain	= 0	3.3 -	= 0	1.72 -
Severe exhaustion	12.7 i.e., 0.127*40		17.8 i.e., 0.178*40	
Mild exhaustion	= 2.0 i.e., 0.02*40	5.1	= 5.4 i.e., 0.054*40	7.1
No exhaustion	= 0	0.8 -	= 0	2.2 -

## 5 DISCUSSION

Work-related ill health is a significant problem around the world, and the costs of this problem are vast for both individuals [2, 3], employers [5, 6], and societies [4-6]. Research shows that there are employers who fail in their work environment management [33] and that even though research-based OSH interventions and WHP exist and are available, there still is a gap between what is produced through research and what is used in practice [31, 71]. Giving employers incentives to increase their engagement in these interventions could help to close this gap. However, the knowledge on what works as incentives for the employers is scarce [31, 37-40]. The results of Study I described and explored the employer's perspective regarding what incentives there are influencing their decision to engage in OSH interventions and WHP. The identified incentives in Study I were divided into five categories and nine sub-categories. Two of the categories and two sub-categories were to some extent consistent with the results of other studies. These were *laws and regulations* [39, 40], *consequences for the workplace* [38-41], *(lack of) knowledge of worker health and workplace health interventions* [40], and *evidence-based research and successful examples* [38-41]. In addition to these incentives, Study I identified one category and one sub-category that have not been addressed in the previous studies, other than somewhat briefly mentioned in the review on employers' motivation to carry out WHP [41]. These were *communication and collaboration with the provider* and *easy to perform and easy to understand*. Furthermore, the present study pointed out that the employers most often consider several incentives at the same time. This indicates that the process of deciding on OSH interventions and WHP is multidimensional and complex, with incentives linked to both consequences for the employer, characteristics of the interventions, the employer's and the provider's previous knowledge, and also their ability to communicate with each other.

Although laws and regulations were pointed out as a strong incentive in Study I and in previous studies [39, 40], the findings in Study I revealed that this incentive was considered as two parted by the participants. The participants stated that laws and regulations most often were followed because it was seen as mandatory to follow the law, which also made it easier to justify and obtain the management's agreement for these interventions. However, the participants also described that the management often was satisfied with only doing as much as the law requires. This was seen as problematic since the participants meant that the minimum requirements of the law are not nearly enough in order to achieve a good work environment. This indicates that laws regulating the work environment (to some extent) work as an incentive regarding OSH interventions and WHP, but it also points out that the laws

need to be extended and complemented by additional incentives to increase the usage of these interventions. Why the law needs to be complemented by additional incentives in areas it is already covering is due to the fact that there are still employers who fail in their work environment in these specific areas [33]. Further studies are therefore needed to deepen our understanding on why the work environment areas covered by law are not always taken care of well enough by the employer to meet the legal requirements. This could provide important information on how to regulate the law in order to increase the incentives for OSH interventions and WHP.

Another finding from Study I in line with previous research [39, 40] is that many employers are aware of the importance of choosing OSH interventions and WHP that are research-based and proven to be effective in order to achieve desired outcomes at the workplace. On the other hand, our findings also revealed that interventions sometimes are poorly chosen and engaged in without any clear thoughts, due to employers with poor knowledge on OSH interventions and WHP. These participants said that they could be influenced by, for example, an acquaintance who expressed that an intervention was good without substantiating why, a telephone call from a skillful salesman or trends. One thing that might be an explanation to the variety of factors, influencing the decisions on engaging in OSH interventions and WHP, was the participants' experience of difficulties with accessing sufficient information about OSH interventions, WHP and their expected outcomes. These experiences could be interpreted as the employer's limited ability to assimilate the information given from researchers and/ or suppliers, which is something that has been identified in previous research [40]. Although based on the findings of this study, it could also be argued for that the researchers and/ or suppliers also need to get better at presenting their research/ information in a popular scientific way, which is more adjusted to the employers' prerequisites and knowledge level. However, the findings from the present study do not elaborate any further on this, and more research is needed on the employers' ability to assimilate information from researchers and suppliers, as well as researchers' and suppliers' ability to communicate their research and knowledge in a way that is adapted to the employers' prerequisites of understanding this type of information. Why it is so important to know more about this is due to the fact that research that nobody takes part in, especially when it comes to those who are concerned by it, is of less use. It is only when the research reaches its audience and is properly implemented that can make a difference.

The findings of Study I, to some extent, are coherent with implementation research and the



theoretical frameworks that are used to identify barriers and facilitators for implementing interventions into practice. Future studies could focus on applying an implementation framework such as the Consolidated Framework for Implementation Research (CFIR) [72] as a frame for interviews and/or surveys aimed at exploring and examining potential barriers and facilitators for implementing OSH interventions and WHP. This framework could contribute with an additional understanding with regards to theoretical constructs that can influence an employer's decision to engage in interventions of this kind.

Further on, the identified incentives in this study are related to both OSH interventions and WHP. It could be the case that the incentives for the decision to engage in interventions differ between OSH interventions and WHP or between different types of interventions within OSH or WHP. This could imply that some of the incentives only apply to certain types of interventions. There could also be a difference in incentives between the public and private sector. Therefore, further studies are needed to deepen the understanding about the role of incentives with regards to the difference between OSH interventions and WHP, the difference between different interventions within the former and the latter, and the difference between the public and private sectors.

However, there are some clinical implications that can be drawn based on our findings, i.e., in order to bridge the gap between what is produced through research and used in practice. There is a need for a broad approach that includes adjustments from the employers, the providers, and the researchers of OSH interventions and WHP, with the further suggestion of:

- Employers need to be better at expressing their expectations of the suppliers and the interventions when ordering OSH and WHP.
- Suppliers need to analyze and pay attention to the workplaces' culture, preconditions, intents, and outspoken needs before offering an intervention.
- Research needs to continue being conducted on:
  1. Costs of different work-related ill health problems at the workplace.
  2. Evidence-based interventions aiming to decrease work-related ill health problems that are costly for the employer.
  3. Quantifiable measurement methods for effective evaluation of the interventions need to be implemented at the workplace.
- Research-based guidelines for OSH interventions and WHP developed to assist the employers in accessing this kind of research. Developing these guidelines could

increase the employers' perception of the interventions as being easy to understand and to perform, and therefore being less time consuming.

One of the incentives identified in Study I, as well as in the other studies, is the need for economic incentives to make the employers engage in interventions at the workplace. One of the areas brought up as more difficult to find economic arguments was interventions, which targeted the psychosocial work environment, since the costs of these problems and the effects of the interventions were found difficult to measure. Problems in the psychosocial work environment could cause work-related stress [19], which is one of the most commonly reported work-related health problems at workplaces today [12-16, 73]. To be able to affect employers to engage in research-based OSH interventions and WHP targeting work-related stress, there is a need to add to the knowledge about the costs of this problem from an employer perspective. The aim of Study II was therefore to examine if work-related stress is associated with production loss through quantifiable measures, giving information of some of the costs of work-related stress at the work place. In Study II, work-related stress was measured as job strain and exhaustion. The results from this study showed that job strain and exhaustion were associated with both health-related and work environment-related production loss and that those employees who reported work-related stress in the survey also reported higher levels of production loss compared to those who did not report work-related stress. However, job strain and exhaustion resulted in various levels of production loss.

There were no previous studies identified that investigated the association between job strain and production loss. The association between the separate factors such as high work demands, job control, and production loss have been investigated in a few studies. For example, low job control was found to be associated with higher production loss in a recent study [67]. Other research findings on work demands and job control showed that high job control was associated with lower levels of production loss, and low job control was associated with higher levels of production loss. Although these studies have no possibility to quantify the production loss caused by work-related stress because they have not made a connection to job strain or other types of measures on work-related stress.

Another study found that exhaustion was associated with production loss [6] and showed that employees with severe exhaustion reported approximately one point higher and three

points higher health-related and work environment-related production loss compared to employees with no exhaustion on a scale ranging from 0-10. The difference between that study [6] and the present one was that the population only consisted of those reporting health-related problems and/or work environment-related problems. In the present study, all employees were included, which could explain the higher difference in the level of production loss. The reason for this difference could be that the previous study might have missed out on those people reporting job strain, exhaustion, and production loss without reporting health-related problems and/or work environment-related problems, therefore underestimating the association between exhaustion and production loss.

The identified levels of production loss in Study II have also been used to calculate the number of lost working hours due to work-related stress. For an employee experiencing job strain and working 40 hours per week, an 8.2 percent production loss would equal 3.3 hours of lost working time. For an employee experiencing severe exhaustion, a 12.7 percent production loss would equal 5.1 hours of lost working time. The loss of working hours can further on be used to calculate the economic cost to the employer, creating possible incentives for OHS interventions and WHP. Although, *calculating the costs* of work-related stress for the workplace only contributes to one of incentives and suggestions mentioned in relation to the result and discussion of Study I, others were, for example: *“the need of research-based interventions aiming to decrease work-related ill health problems that are costly for the employer”* and *“quantifiable measurement methods for effective evaluation of the interventions implemented at the workplace.”* This points out that the information of the costs itself is not always enough to create incentives; additional research needs to be developed and/or presented in order for the employers to engage in OSH interventions and WHP.

What also needs to be pointed out, in relation to the above-mentioned reasoning, is that work-related ill health consists of multiple disorders, not only those that could arise from work related stress. Other common disorders are hearing impairment, repetitive strain injuries, musculoskeletal disorders, cardiovascular diseases, respiratory allergies, lung diseases, cancer, skin diseases, different health-related consequences due to work-related injuries, etc. All of these different disorders represent different costs for the employer and need their own calculations to create incentives for targeted OSH interventions and WHP. Also, the workplace is an important arena to reach other health problems other than work-related health problems, since the workplace gathers a significant part of the population

over a long period of time. These health problems can also be costly for the employers and profitable for them to do something about correcting them.

## **5.1 METHODOLOGICAL CONSIDERATIONS, STRENGTHS AND LIMITATIONS**

### **5.1.1 Study I**

The reason for using multiple research analysts, i.e., analyst triangulation [70], and having an inter-professional team in Study I was to strengthen the credibility and confirmability of the analysis. This minimized the risk of it being characterized by only one person and his or hers possibly own understanding of the phenomenon or a certain professional background [70]. During the analysis, it was also created a physical audit trail [74] to enhance confirmability and to enable dependability. It would have been beneficial to perform a member check to enhance the trustworthiness of the study even further [55]. However, this was not possible for practical reasons, such as the considerable length of time between the interviews and analysis and the participants finding it difficult to spend time on the study.

A possible limitation and concern of the study could be that a large number of participants were invited and only a few agreed to participate, leading to a positive influence on the results with participants unusually interested in OSH interventions and WHP, having more prudent and extensive interventions than to those who declined to participate. However, several of the participants had few OSH interventions and WHP in place and sometimes had poor knowledge about these interventions, lessening this concern.

There was an ambition of having 4-6 participants in each focus group interview, since this is recommended in the literature to achieve a giving interaction [27]. A possible limitation of this study is that this number was not achieved in two of the focus groups due to late cancellations, i.e., cancellations on the same day as the interviews were being held. This is something that could have affected the desired accumulation of the participants' consciousness and ability to explore and clarify individual and shared perspectives in the interviews, but not necessarily. This is because it is recommended to have smaller focus groups when participants are expected to have a great deal to say about the topic [51]. In this study purposive sampling was used because this sampling method aims to target individuals that have extensive experience and can offer specific information on the objective of the study [55].

There was one of the participants that had worked for less than six months at her current workplace; due to this she did not fulfill the inclusion criteria of having worked for at least for six months at the same workplace. This is something that can be seen as a limitation of the study, but not necessarily. It was reasoned that this participant, with her long working experience regarding the requested issues, made her relevant for the study with much knowledge to contribute with. This participant had worked with these issues for 10 years and the aim of this inclusion criterion was to ensure enough experience for the participants to have relevant things to say in relation to the objective of the study.

### **5.1.2 Study II**

Study II has used a cross-sectional study design. This design cannot determine cause and effect; it can only show that there is an association between work-related stress and production loss, without the possibility to say whether work-related stress results in production loss or if the relationship is reversed with the experience of production loss leading to stress. This is something that can be seen as a limitation of the study depending on the aim. However, this study required a cross-sectional design to assess the direct association between work-related stress and production loss in order to be able to calculate the cost of work-related stress in terms of lost working hours. This was done by measuring the production loss that arose at the time when employees perceived stress at work.

The data collection in Study II has been conducted through self-reported measures, and these measures are often brought up as a limitation in research. Work environment-related problems are difficult to measure objectively, since a situation perceived as problematic by one employee might not be perceived the same way by someone else. For this reason a self-reported measure is relevant if it is reliable and valid. Self-reported measures are also inexpensive and easily accessible compared to other measures in order to assess the occurrence of health problems in large populations, e.g., different workplaces. Further on, subjective data, such as self-rated health, has been shown to be an independent predictor of future mortality [75]. Several studies have also tested the predictive power and validity of self-assessment methods in work contexts with positive results [76, 77].

Both job strain and exhaustion were used to measure work-related stress. There were 7% of the respondents who had the combination severe exhaustion and no job strain and 7% who had the combination no exhaustion and job strain. Including both of these measures, capturing respondents both experiencing short-term stress and/or long-term stress at the

workplace minimized the risk of missing out of relevant respondents experiencing work-related stress. Production loss was measured both as work environment-related production loss and health-related production loss. Both instruments turned out to be complementary, as some of the respondents had the combination work-related stress and work environment-related production loss, while others had the combination of work-related stress and health-related production loss. Without both measures there would have been an underestimation of the production loss and also the cost of work-related stress to employers. The reason for these measures being complementary could be that problems in the work environment could be stressful, causing production loss, without being perceived as health problems, or before being perceived as a health problem.

There were 82.1% women and 17.9% men in this study, which are representative for the proportion of employed women and men in Sweden's municipalities [78]. This indicates that the study result is generalizable to other Swedish municipalities or workplaces with similar professions, but further studies would be needed to evaluate the economic consequences of work-related stress in other sectors. The response rate of Study II was 89%; it could be considered a strength of the study. However, 9.8% of these 89% respondents did not answer the questions used to measure exhaustion. The questions regarding exhaustion were at the end of the survey, and an explanation of the internal missing could be that the questionnaire might have been too extensive to answer for those participants with the highest levels of work-related stress. Theoretically, this could have led to a certain underestimation or overestimation of the association between exhaustion and production loss.

## **6 CONCLUSION**

The present thesis contributes to further knowledge of factors that from an employer's perspective could increase the use of research-based OSH interventions and WHP. The conclusion of Study I was that employers' decisions to engage in OSH interventions and WHP were influenced by several incentives. There were those incentives that led to a desire to engage in these kinds of interventions, for example, avoiding costs, while other incentives were related to other aspects such as the characteristics of the employer, the provider, and the intervention. All seemed to be important to consider when trying to increase employers' engagement in OSH interventions and WHP and to bridge the gap between what is produced through research and what is used in practice. Furthermore, the communication between the employer and the provider was not always experienced as satisfactory. It could be beneficial to provide a checklist of important aspects that need to be communicated in the collaboration between the stakeholders and to develop guidelines for research-based OSH interventions and WHP. The conclusion of Study II was that work-related stress, measured as job strain and exhaustion, was associated with increased production loss at the workplace, which resulted in loss of working hours at the workplace. If employers would be able to reduce the proportion of employees experiencing job strain and exhaustion, this could have a positive effect on work productivity and efficiency and thereby be used as an economic incentive to increase the use of OSH interventions and WHP targeting work-related stress.

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